

# **SAM2000G-12**

## **12-Port SHDSL Access Multiplexer**

**Also: SAM2000Q-12 (2B1Q) and SAM2000-12 (CAP)**

### **1.0 SDSL ACCESS MODULE MODELS**

SDSL access multiplexers are intended for use in Net to Net Technologies' IPD12000 and IPD4000 DSLAMs. Model types vary by the SDSL line code utilized.

#### **1.1 SAM2000G-12**

The SAM2000G-12 operates with Transmission Convergence/Pulse Amplitude Modulation (TC/PAM) line code: a sixteen-level PAM technique which incorporates advanced Trellis code, precoding, spectral shaping, equalization circuits and forward error correction. Otherwise known as G.SHDSL or SHDSL.

#### **1.2 SAM2000Q-12**

The SAM2000Q-12 operates with Two Binary, One Quaternary (2B1Q) line code: a four-level PAM technique which reduces the signaling rate to half of the bit rate.

#### **1.3 SAM2000-12**

The SAM2000G-12 operates with Carrierless Amplitude and Phase (CAP) modulation line code: transmit and receive signals are modulated into two wide-frequency bands that can pass through a filter without being attenuated.

**NOTE** Throughout this document, "SAM2000G" is utilized to indicate all three SDSL access multiplexer models; information given applies to all three models except as individually stated or otherwise noted.

## 2.0 INSTALLATION

**CAUTION** Net to Net Technologies strongly recommends the use of proper electrostatic discharge (ESD) precautions when handling this equipment.

### 2.1 Unpack and Inspect the SAM2000G

If there is visible damage, do not attempt to connect the device; contact Customer Support at 1-877-638-2638 (1-603-427-0600 for international customers) or [support@nettonet.com](mailto:support@nettonet.com).

### 2.2 Install the SAM2000G in an IP DSLAM Chassis

**NOTE** There must be a Multiplexer Uplink Module (MUM) installed in your IP DSLAM chassis in order for interface modules to operate.

Net to Net Technologies' IP DSLAM interface modules are hot swappable; installing or removing an interface module while the chassis is powered up does not affect the operational status of other interface modules within the chassis. The IPD12000 is a fourteen slot chassis; slots 1-12 are for interface modules such as the SAM2000G, slots 13 and 14 are reserved for MUMs. Interface modules may be placed in any order in slots 1-12. The IPD4000 is a five slot chassis; slots 1-4 are for interface modules, slot 5 is reserved for a MUM.

- Align the SAM2000G with the module guides in the slot chosen for installation (slot 1-12 on the IPD12000 or slot 1-4 on the IPD4000).
- Slide the SAM2000G firmly into the chassis. DO NOT USE EXCESS FORCE.
- Secure the SAM2000G by tightening the fastening screws on the module faceplate.
- Verify that the PWR (Power) LED on the SAM2000G faceplate is illuminated.

### 2.3 Connect the SHDSL Line(s)

Plug the SHDSL cable into the RJ21 port, of the chosen slot, on the back of your IP DSLAM. Verify your connections; the SHDSL LK LED for each connected port will illuminate solid or pulsing green. Link-up time for connections between the SAM2000G and remote SHDSL modems can vary from one to five minutes depending on the quality, gauge and distance of the copper cables. Default bandwidth for the SAM2000G is 272 kbps.

SHDSL RJ21 PORT PINOUT													
PORT	1	2	3	4	5	6	7	8	9	10	11	12	
SHDSL	Ring	1	2	3	4	5	6	7	8	9	10	11	12
	Tip	26	27	28	29	30	31	32	33	34	35	36	37

(pins 13-25 and 38-50 are not used)

## 3.0 SAM2000G DEFAULT CONFIGURATIONS

No configuration is necessary for the SAM2000G to operate at default settings.

### 3.1 IP DSLAM Management

#### 3.1.1 User Access

**NOTE** All usernames and passwords are case sensitive.

##### 3.1.1.1 Network Management System (NMS) and Command Line Interface (CLI)

ACCESS	USERNAME	PASSWORD
read/write	superuser	Password
read only	general	Password

##### 3.1.1.2 Simple Network Management Protocol (SNMP)

ACCESS	COMMUNITY STRING
read/write	Password
read only	Password

#### 3.1.2 Management Parameters

The parameter defaults listed are common to all DSLAM/MUM model types. Some models have additional configuration possibilities; refer to the User Guide and/or Installation Instructions for your particular model.

PARAMETER	DEFAULT CONFIGURATION
Gateway	0.0.0.0
Inband Management	off
Inband Management VLAN ID	0 (off)
IP Address: IPD12000 Slot 13	192.168.254.252
IP Address: IPD12000 Slot 14	192.168.254.253
IP Address: IPD4000 Slot 5	192.168.254.252
Management IP Address Filter Range	0.0.0.0 - 255.255.255.255 (all)
Subnet Mask	255.255.255.0

### 3.2 SAM2000G Port Parameters

PARAMETER	DEFAULT CONFIGURATION
Circuit Identification	n/a (no default)
Back-bone VLAN	0 (off)
Flood	uplink
IP Range 1	0.0.0.0 - 255.255.255.255 (all)
IP Range 2	0.0.0.0 - 0.0.0.0
Priority (VLAN)	0 (none)
Protocol	all
Speed	272 kbps
VLAN Range	0 - 0 (off)

## 4.0 SAM2000G MANAGEMENT

Once your SAM2000G has been installed, bandwidth and other configurations are software selectable via your IP DSLAM's MUM. Dependent upon the MUM model installed, the SAM2000G may be configured via Command Line Interface (CLI), Simple Network Management Protocol (SNMP) and/or Net to Net Technologies' web-based Network Management System (NMS).

If your IP DSLAM is newly installed, configuration of the DSLAM's IP Address, Subnet Mask and Gateway must be completed, via CLI or NMS, before you will be able to access management data or configure any other parameters. Refer to the CLI Management User Guide (<http://www.nettonet.com/support/docs/210-000052>) or to the NMS Management User Guide (<http://www.nettonet.com/support/docs/210-000048>) for initial configuration instructions.

**NOTE** If you have an IPD12000 with two MUMs, configuration alterations can be made to a SAM2000G through either MUM; most configuration(s) will be saved to the NVRAM of both. Refer to your MUM Installation Instructions for specifics.

## **4.1 Via Command Line Interface (CLI)**

### **4.1.1 Establish a Connection With Your IP DSLAM**

Establish a connection between your IP DSLAM and your PC, either directly (through the COM port on the MUM faceplate) or, if your DSLAM has been configured to allow inband management, across your local network.

### **4.1.2 Launch Your Terminal Emulator**

Launch a terminal emulator program on your PC. Net to Net Technologies' copyright information will appear on your screen, followed by a request for username.

### **4.1.3 Log In**

Log in with your assigned username and password. For SAM2000G configuration, you must log in as a superuser (general users have read only access). If your username and/or password are unknown, contact your System Administrator or Information Technology Manager for assistance.

Once you have logged in as a superuser, you will be able to make configuration changes to the SAM2000G, and any other interface modules installed in your IP DSLAM, as desired. For more detailed information regarding SAM2000G configuration via CLI, refer to Net to Net's CLI Management User Guide: <http://www.nettonet.com/support/docs/210-0000052>.

## **4.2 Via Net to Net's Network Management System (NMS)**

### **4.2.1 Establish a Connection With Your IP DSLAM**

Establish a connection between your IP DSLAM and your PC, either directly (through the 10/100 Ethernet MGMT port on the MUM faceplate) or, if your DSLAM has been configured to allow inband management, across your local network. For direct connections, verify that the MGMT LNK LED on the MUM faceplate is illuminated.

### **4.2.2 Launch Your Web Browser**

Launch a web browser on your PC such as Microsoft Internet Explorer or Netscape Navigator.

### **4.2.3 Enter Your DSLAM's IP Address**

Enter the DSLAM's IP Address into the address field at the top of your browser window and press the Enter key.

#### 4.2.4 Log In

Log in with your assigned username and password. For SAM2000G configuration, you must log in as a superuser (general users have read only access). If your username and/or password are unknown, contact your System Administrator or Information Technology Manager for assistance.

Once you have logged in as a superuser, you will be able to make configuration changes to the SAM2000G, and any other interface modules installed in your IP DSLAM, as desired. For more detailed information regarding SAM2000G configuration via NMS, refer to Net to Net's NMS Management User Guide: <http://www.nettonet.com/support/docs/210-000048>.

### 4.3 Via Simple Network Management Protocol (SNMP)

**NOTE** The MUM200-2 does not have SNMP capabilities; you must have a MUM2000-2 installed in your IP DSLAM in order to access DSLAM management or any interface modules via SNMP.

#### 4.3.1 Establish a Connection With Your IP DSLAM

Establish a connection between your IP DSLAM and your PC, either directly (through the 10/100 Ethernet MGMT port on the MUM faceplate) or, if your DSLAM has been configured to allow inband management, across your local network. For direct connections, verify that the MGMT LNK LED on the MUM faceplate is illuminated.

#### 4.3.2 Launch Your MIB Browser

Launch a MIB browser program on your PC. If you have not yet downloaded the necessary MIBs to your PC or local network, you can obtain the Net to Net enterprise MIBs from <ftp://ftp.nettonet.com/download/mibs> and the supported portions of MIB-II from the Internet Engineering Task Force RFC 1213 at <http://www.ietf.org/rfc.html>. After downloading the MIBs, you will need to compile them into your MIB browser; refer to your MIB browser user manual for further instruction.

Once the MIBs have been compiled, you will be able to make configuration changes to the SAM2000G, and any other interface modules installed in your IP DSLAM, as desired. For more detailed information regarding SAM2000G configuration via SNMP, refer to Net to Net's SNMP Management User Guide: <http://www.nettonet.com/support/docs/210-000053>.

## 5.0 BANDWIDTH AND DISTANCE

**NOTE** Parameters common to all interface module models are defined in the CLI, NMS and SNMP Management User Guides. Bandwidth, however, is specific to the SAM2000G-12, SAM2000Q-12 and SAM2000-12.

The SAM2000G-12, SAM2000Q-12 and SAM2000-12 each have nine SHDSL bandwidth options; default is 272 kbps. Distance capabilities at each bandwidth vary, dependent upon the type of line code being utilized. Distances listed below assume the use of 26 American Wire Gauge (AWG) cable; connections made with cable of a greater gauge will link up at greater distances. The ports on your module may not link up if your cables are in poor condition or if cable distances are greater than the configured bandwidth will support. Although it is sometimes possible for links to be achieved under such conditions, traffic quality may be effected (e.g., packets may be dropped).

SHDSL BANDWIDTH		kbps	2,320	2,064	1,552	1,040	784	528	400	272	144
DISTANCE	<b>SAM2000G-12</b> TC/PAM line code: SHDSL	feet	11,300	12,200	12,800	16,000	16,800	18,400	19,400	20,200	25,400
		meters	3,444	3,719	3,901	4,877	5,121	5,608	5,913	6,157	7,742
	<b>SAM2000Q-12</b> 2B1Q line code	feet	10,400	10,800	13,400	14,800	15,800	17,400	18,200	19,200	23,800
		meters	3,170	3,292	4,084	4,511	4,816	5,304	5,547	5,852	7,254
	<b>SAM2000G-12</b> CAP line code	feet	11,000	11,900	12,600	15,500	16,000	17,900	18,900	23,100	24,700
		meters	3,353	3,627	3,840	4,724	4,877	5,456	5,761	7,041	7,529

## 6.0 ADDITIONAL INFORMATION

### 6.1 Data Storage

Configuration backup is inherent in Net to Net Technologies IP DSLAMs. SAM2000G default parameters remain in place unless changed via CLI, NMS or SNMP. Once changed, new configurations are automatically recorded in both RAM and NVRAM.

#### 6.1.1 Memory

##### 6.1.1.1 Random Access Memory (RAM)

Data stored in SAM2000G RAM will be erased if the module is removed from your IP DSLAM or if your IP DSLAM loses power.

##### 6.1.1.2 Non-Volatile Random Access Memory (NVRAM)

Data stored in the NVRAM of your IP DSLAM's MUM will remain intact (even if your IP DSLAM loses power) unless deliberately cleared or reconfigured.

#### 6.1.2 Local Files

Management and interface module configurations can be saved on your PC, or local network, both as a backup and/or for use as a template for future configurations, via the MUM in your IP DSLAM. Management configurations and all interface module port configurations are saved

concurrently; SAM2000G configurations cannot be saved independently. Once your IP DSLAM has been configured as desired (including the SAM2000G), settings can be flash uploaded (to a local file) through a Trivial File Transfer Protocol (TFTP) tool with a GET command and the following information:

### 6.1.2.1 Backup

An IP DSLAM backup file records ALL management and port configurations.

ITEM	DATA NEEDED FOR BACKUP	EXAMPLE
Host Name	DSLAM_IP Address (xxx.xxx.xxx.xxx)	193.166.254.98
Remote Filename	NVR_BACKUP.BIN.[superuser password]	nvr_backup.bin.Password
Local Filename	user preference	dslam27_mum13_backup.bin

### 6.1.2.2 Template

An IP DSLAM template file records all management and port configurations EXCEPT the MUM's IP Address.

ITEM	DATA NEEDED FOR BACKUP	EXAMPLE
Host Name	DSLAM_IP Address (xxx.xxx.xxx.xxx)	193.166.254.98
Remote Filename	NVR_CFG.BIN.[superuser password]	nvr_cfg.bin.Password
Local Filename	user preference	n2n_dslam12000_template.bin

Configuration files can also be flash downloaded FROM a local file TO an IP DSLAM, simply replace the GET command with a PUT command. Refer to your TFTP user manual for further instruction.

## 6.2 LED Indications

LED	State	Indication	Additional Information
SHDSL Link (Lk)	pulsing green	SHDSL connection is established and active	The SHDSL link is operational and traffic is flowing.
	solid green	problematic SHDSL connection	A connection exists but there is indication of a problem with the SHDSL line.
	no illumination	no SHDSL connection	



<b>SHDSL Data Reception (Rx)</b>	flashing amber	SHDSL activity	The port is receiving data from the remote SHDSL modem or statistical packets from your IP DSLAM's management.
	solid amber	heavy Rx traffic	The port is receiving large amounts of data from the remote SHDSL modem or statistical packets from your IP DSLAM's management.
	no illumination	no activity	A link may exist but the port is not receiving any data from the remote SHDSL modem or statistical packets from your IP DSLAM's management.
<b>SHDSL Data Transmission (Tx)</b>	flashing amber	SHDSL activity	The port is transmitting data to the remote SHDSL modem.
	solid amber	heavy Tx traffic	The port is transmitting large amounts of data to the remote SHDSL modem.
	no illumination	no activity	A link may exist but the port is not transmitting any data to the remote SHDSL modem.

(A pulsing LED blinks steadily at a rate of once per second. A flashing LED blinks at a more rapid, less constant rate.)

### 6.3 Regulatory Compliance for Class A Equipment

The following regulatory compliance information applies to the SAM2000G-12, SAM2000Q-12 and/or SAM2000-12 as installed in Net to Net Technologies' IP DSLAMs.

#### 6.3.1 US Federal Communications Commission (FCC)

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution: Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

#### 6.3.2 Industry Canada

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

#### 6.3.3 Europe

This Class A product complies with European Norm EN55022.

Warning: In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures to correct the situation.

210-0000026 rev07

© Copyright 2003 Net to Net Technologies, Inc.

™ The Net to Net Logo is a trademark of Net to Net Technologies, Inc.

---

**Worldwide Headquarters**

Net to Net Technologies  
112 Corporate Drive  
Portsmouth, NH 03801  
USA  
+1 877-638-2638

<http://www.NetToNet.com/>  
[Contact@NetToNet.com](mailto:Contact@NetToNet.com)

**EMEA Headquarters**

Net to Net Technologies  
Victoria House 19 Park Way  
Newbury Berkshire RG14 1EE  
UK  
+44 (0) 1635 570950

210-0000026 rev07